

2015 Cygnus-4 Capture and Install Qualify

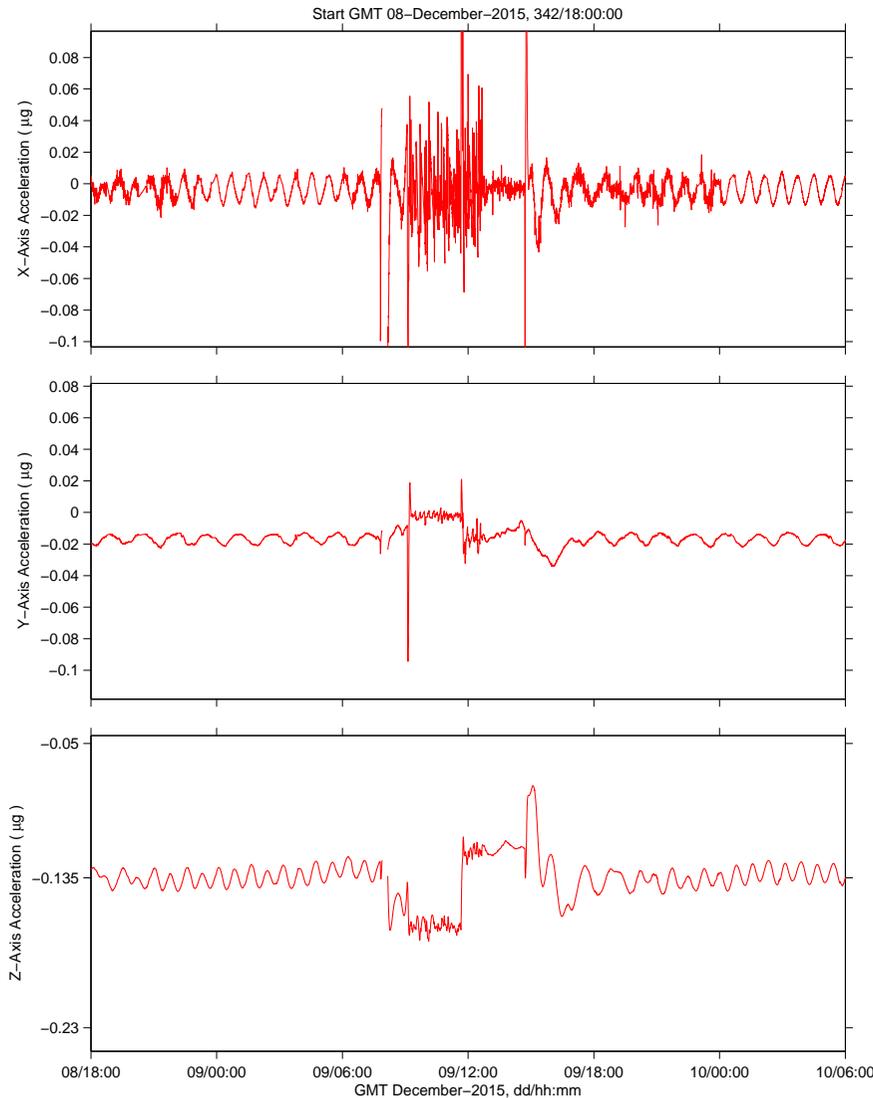
Description	
Sensor	MAMS ossbtfm 0.0625 sa/sec, 0.01 Hz
Location	LAB1O2, ER1, Lockers 3,4
Plot Type	XYZ Accel. vs. Time

Notes:

- This 3-panel plot of XYZ acceleration versus time shows the quasi-steady microgravity environment associated with the capture and install of the Cygnus-4 cargo vehicle.
- These plots span from GMT 08-Dec-2015/18:00 to 10-Dec-2015/06:00.
- The black trace in these plots show MAMS OSS data and you can see crew sleep periods that normally end at 06:00 each day.
- The red trace in these plots show acceleration levels derived from ISS rates and angles data.
- As a qualitative note, see from the y-axis scale on these plots that the capture and berthing of Cygnus-4 vehicle on GMT 09-Dec-2015 were very subtle, but more on this point comes with subsequent plots in this document.

Regime:	Vibratory
Category:	Vehicle
Source:	2015 Cygnus-4 Capture and Install





2015 Cygnus-4 Capture and Install Quantify

Description	
Sensor	ISS radgse 0.0625 sa/sec, 1.0 Hz
Location	ISS radgse PAD archive support
Plot Type	XYZ Accel. vs. Time

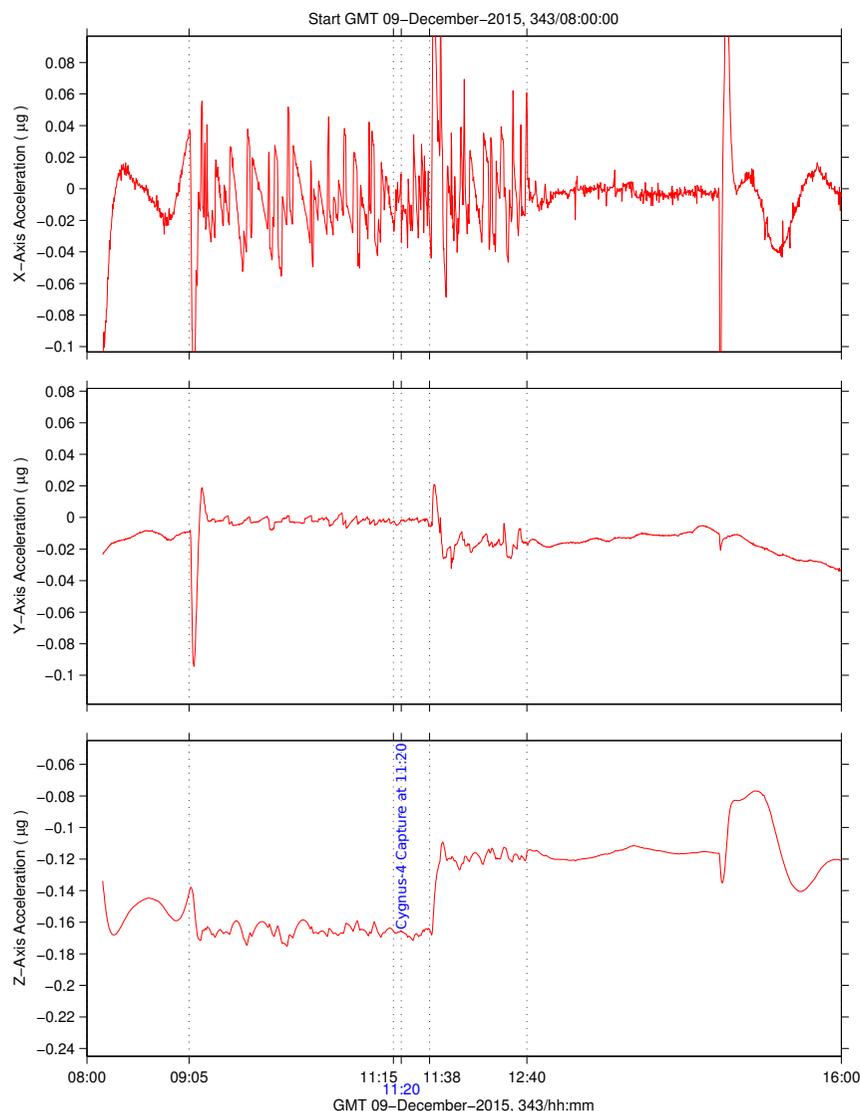
Notes:

- This 3-panel plot of XYZ acceleration versus time shows the quasi-steady microgravity environment associated with the capture and install of the Cygnus-4 cargo vehicle, and here we have zoomed in on the y-scale for each plot.
- Perhaps the most important message coming from these plots is that besides the maneuvers needed to orient the ISS for capture and berthing seen clearly on GMT 09-Dec-2015, the net quasi-steady impact is very small when we compare the 12 hours on the left-hand side of these plots before berthing relative to the 12 hours on the right-hand side after the berthing.
- Contrast this with Dragon-3 capture and install earlier in 2014.

Regime:	Vibratory
Category:	Vehicle
Source:	2015 Cygnus-4 Capture and Install



2015 Cygnus-4 Capture and Install Quantify



Description	
Sensor	ISS radgse 0.0625 sa/sec, 1.0 Hz
Location	ISS radgse PAD archive support
Plot Type	XYZ Accel. vs. Time

Notes:

- This 3-panel plot of XYZ acceleration versus time shows 8-hour zoom-in on time around the quasi-steady microgravity environment associated with the capture and install of the Cygnus-4 cargo vehicle.
- From 09:05 to 09:10, the ISS did a maneuver to capture attitude. This is seen as a sudden step down on the Z-axis.
- Next, at 11:15 they went to attitude hold with desats (thrusters) inhibited, with Cygnus-4 free flying to Node 1 nadir port.
- At 11:20, the ISS robotic arm was used to capture the Cygnus-4 cargo ship.
- Starting at 11:38, the ISS did a maneuver to Cygnus-berthed attitude. This is seen as step up on the Z-axis.
- At 12:40, the ISS went to momentum management for attitude control.
- From 12:50 to 14:37, ISS thrusters were disabled to allow for Cygnus-4 install via robotic arm.

Regime:	Vibratory
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2015 Cygnus-4 Capture and Install Ancillary Notes

The table below shows the as-flown timeline of events leading up to Cygnus-4 capture on GMT 09-Dec-2015 at 11:20 via robotic arm. This was followed by install between 12:50 and 14:37. As seen in the plots on the previous pages, the main impact on the microgravity environment was the maneuver to capture attitude, the maneuver to Cygnus-berthed attitude. No notable resultant shift of the quasi-steady (steady state) Z-axis acceleration vector was noted.

Cygnus4 Capture (M15_343_B_03.UAF)										12/09/2015
108	343/09:05 —	Y	+9	+XVV +ZLV TEA	LVLH	+356.000 +358.000 +0.700	MMT UST	Transition to USTO		
109	343/09:05 343/09:10	Y	+9	+XVV +ZLV	LVLH	+357.000 +357.000 +1.000	UST UST	Maneuver to Cygnus Capture Attitude		
110	343/11:15 —	Y	+9	+XVV +ZLV	LVLH	+357.000 +357.000 +1.000	UST AHC	Transition to Att Hold with Desats Inhibit (Orbital FF to N1 Nadir)		Cygnus Capture @ 11:20
111	343/11:23 —	Y	+9	+XVV +ZLV	LVLH	+357.000 +357.000 +1.000	AHC UST	Transition to USTO		
112	343/11:38 343/11:27	Y	+9	+XVV +ZLV TEA	LVLH	+356.000 +358.000 +0.700	UST UST	Maneuver to Cygnus Berthed TEA		
113	343/12:40 —	Y	+9	+XVV +ZLV TEA	LVLH	+356.000 +358.000 +0.700	UST SAT	Transition to Momentum Management using USTO		TEA for VV#3z_N1nCN2nezefe, PSARJ Auto, SSARJ Auto
Cygnus4 Install N1N Thruster Disable (M15_343_C_03.UAF)										12/09/2015
114	343/12:50 343/14:37	Y	+9	+XVV +ZLV TEA	LVLH	+356.000 +358.000 +0.700	SAT SAT	Disable Thrusters		Thrusters disabled via software inhibits
115	343/14:37 —	Y	+9	+XVV +ZLV TEA	LVLH	+356.000 +358.000 +0.700	SAT MMT	Enable Thrusters		

